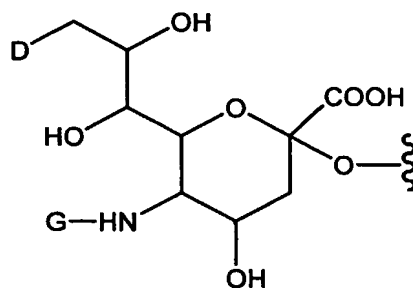


**WHAT IS CLAIMED IS:**

- 1 1. An erythropoietin peptide comprising the moiety:



2

3

wherein

4

D is a member selected from -OH and  $R^1$ -L-HN-;

5

G is a member selected from  $R^1$ -L- and  $-C(O)(C_1-C_6)alkyl$ ;

6

$R^1$  is a moiety comprising a member selected a moiety comprising a straight-chain or branched poly(ethylene glycol) residue; and

7

8

L is a linker which is a member selected from a bond, substituted or

9

unsubstituted alkyl and substituted or unsubstituted heteroalkyl,

10

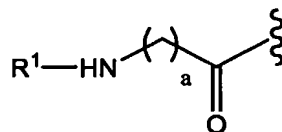
such that when D is OH, G is  $R^1$ -L-, and when G is  $-C(O)(C_1-C_6)alkyl$ , D is

11

$R^1$ -L-NH-.

1

2. The peptide according to claim 1, wherein L- $R^1$  has the formula:



2

3

wherein

4

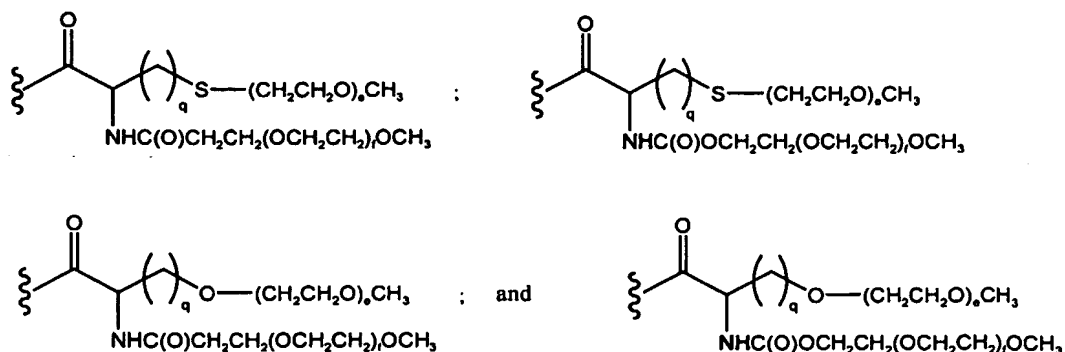
a is an integer from 0 to 20.

1

3. The peptide according to claim 1, wherein  $R^1$  has a structure that is a member

2

selected from:

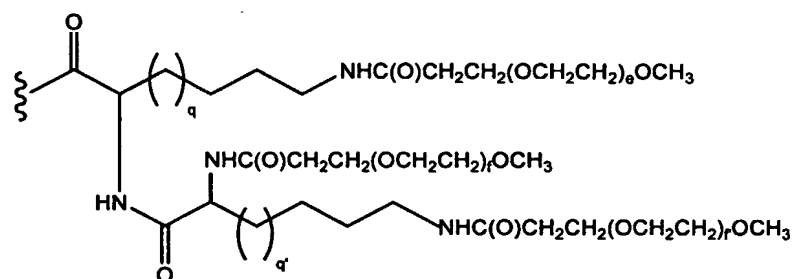
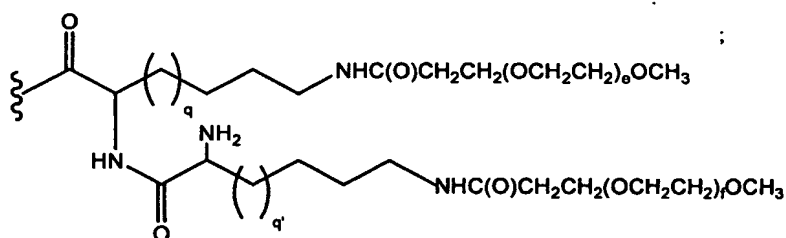
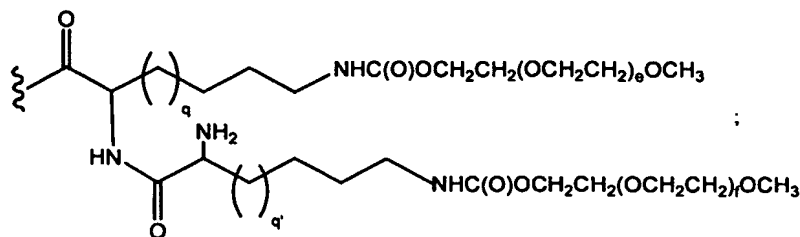


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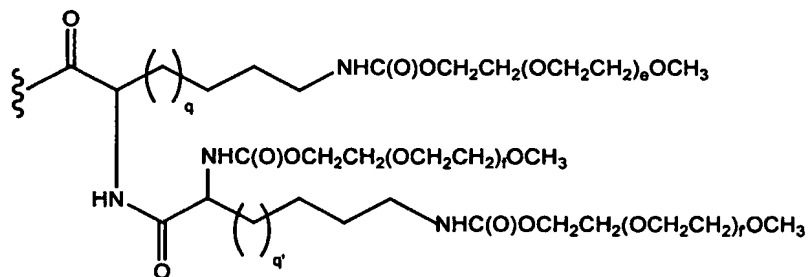
4

wherein

- 5 e and f are integers independently selected from 1 to 2500; and  
 6 q is an integer from 0 to 20.  
 1 4. The peptide according to claim 1, wherein R<sup>1</sup> has a structure that is a member  
 2 selected from:



; and



3

4

wherein

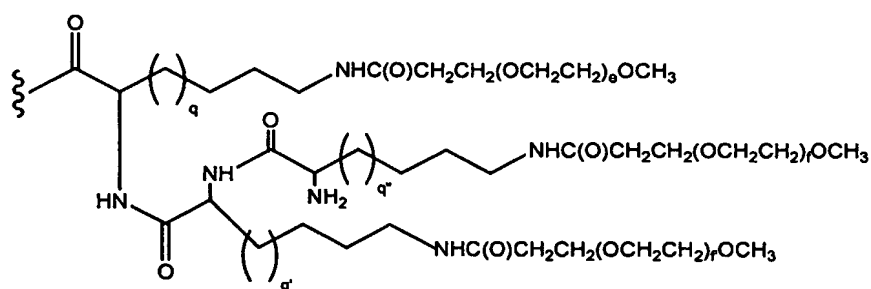
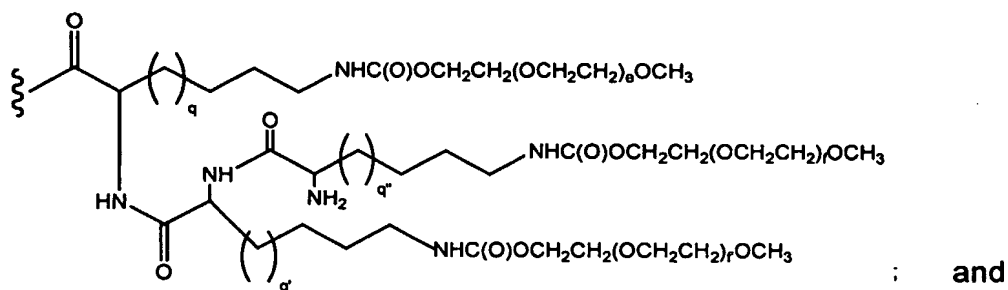
5

e, f and f' are integers independently selected from 1 to 2500; and

6

q and q' are integers independently selected from 1 to 20.

- 1 5. The peptide according to claim 1, wherein R<sup>1</sup> has a structure that is a member  
2 selected from:



3

4

wherein

5

e, f and f' are integers independently selected from 1 to 2500; and

6

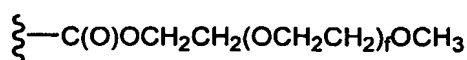
q, q' and q'' are integers independently selected from 1 to 20.

1

6. The peptide according to claim 1 wherein R<sup>1</sup> has a structure that is a member

2

selected from:



3

4

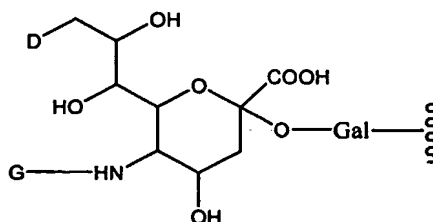
wherein

5

e and f are integers independently selected from 1 to 2500.

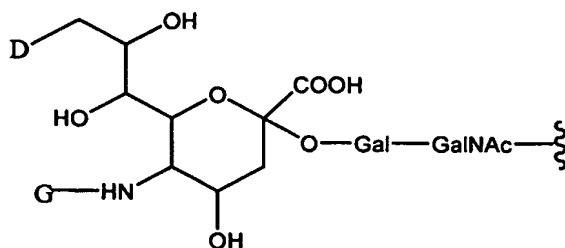
1

7. The peptide according to claim 1, wherein said moiety has the formula:

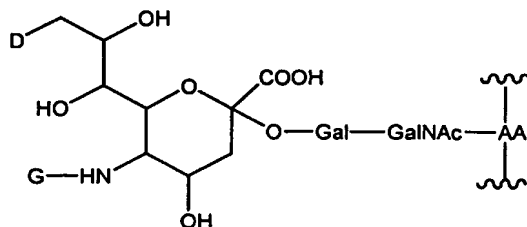


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- 1    **8.**    The peptide according to claim 1, wherein said moiety has the formula:

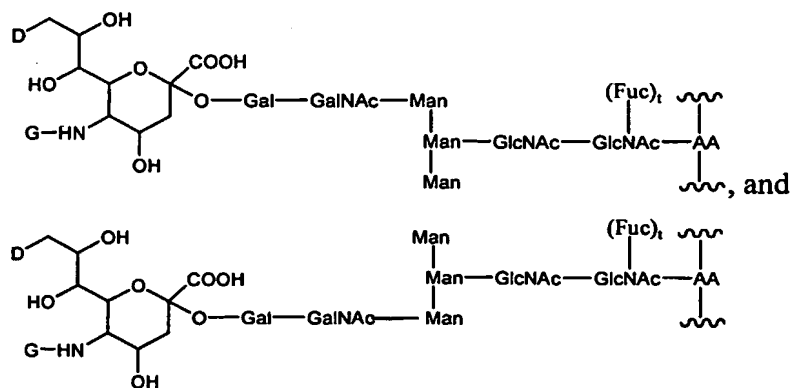


- 1    **9.**    The peptide according to claim 1, wherein said moiety has the formula:



wherein AA is an amino acid residue of said peptide.

- 1    **10.**    The peptide according to claim 9, wherein said amino acid residue is a  
2    member selected from serine or threonine.
- 1    **11.**    The peptide according to claim 10, wherein said peptide has the amino acid  
2    sequence of SEQ. ID. NO:1.
- 1    **12.**    The peptide according to claim 11, wherein said amino acid residue is a serine  
2    at position 126 of SEQ. ID. NO:1.
- 1    **13.**    The peptide according to claim 1, wherein said peptide comprises at least one  
2    of said moiety according to a formula selected from:

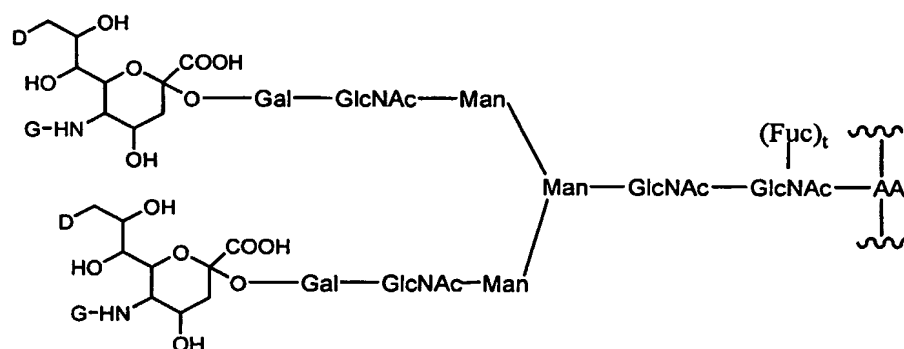


- wherein AA is an amino acid residue of said peptide and t is an integer equal to 0  
or 1.

1 **14.** The peptide according to claim 13, wherein said amino acid residue is an  
2 asparagine residue.

1 **15.** The peptide according to claim 14, wherein said peptide has the amino acid  
2 sequence of SEQ ID NO:1, and wherein said amino acid residue is an asparagine  
3 residue which is a member selected from N24, N38, N83, and combinations thereof.

1 **16.** The peptide according to claim 1 wherein said peptide comprises at least one  
2 of said moiety according to the formula:

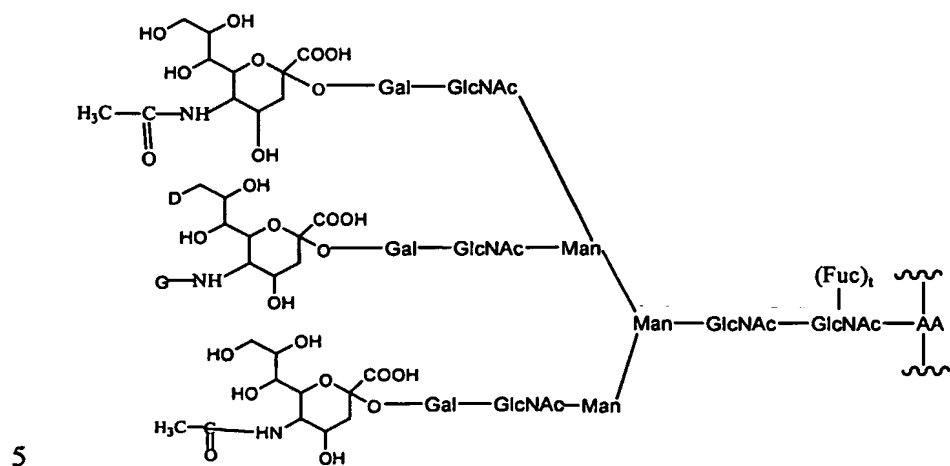
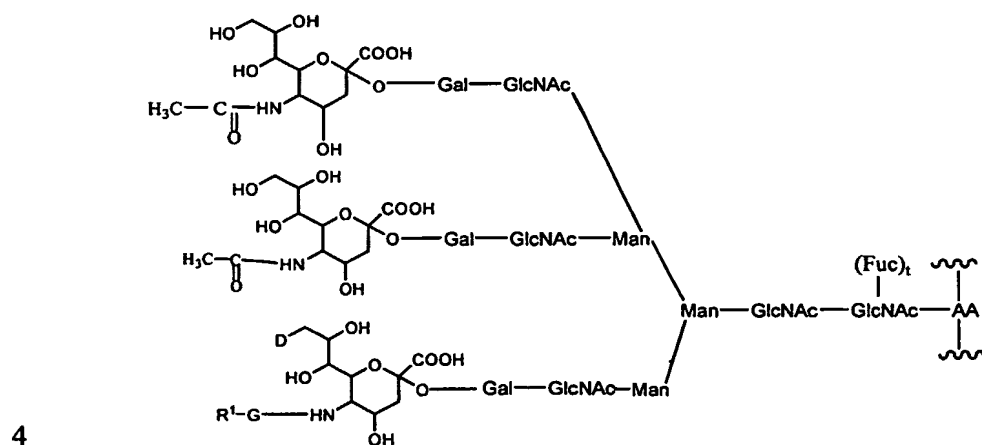
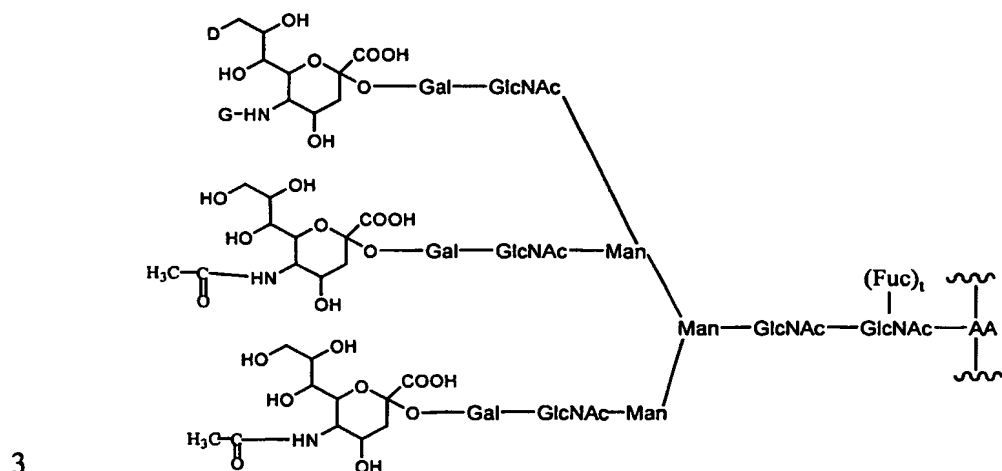


3  
4 wherein AA is an amino acid residue of said peptide, and t is an integer equal to 0 or  
5 1.

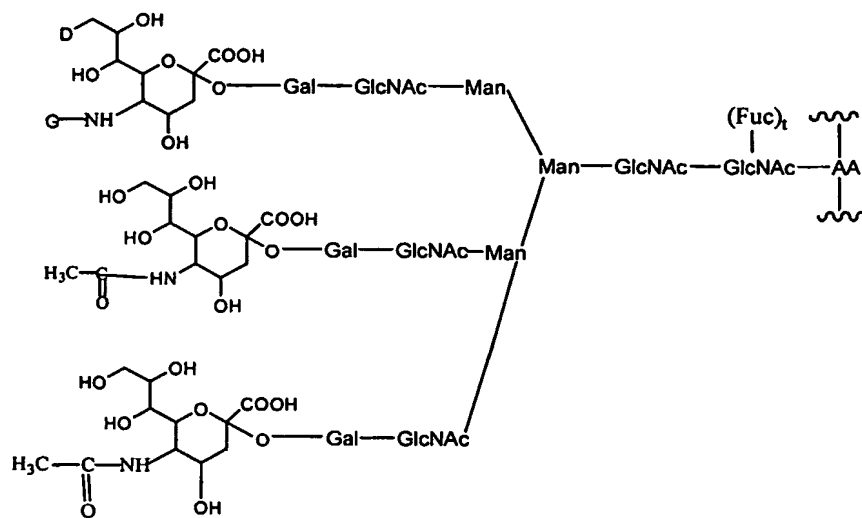
1 **17.** The peptide according to claim 16, wherein said amino acid residue is an  
2 arginine residue.

1 **18.** The peptide according to claim 17, wherein said peptide has the amino acid  
2 sequence of SEQ ID NO:1, and wherein said amino acid residue is an asparagine  
3 residue which is a member selected from N24, N38, N83, and combinations thereof.

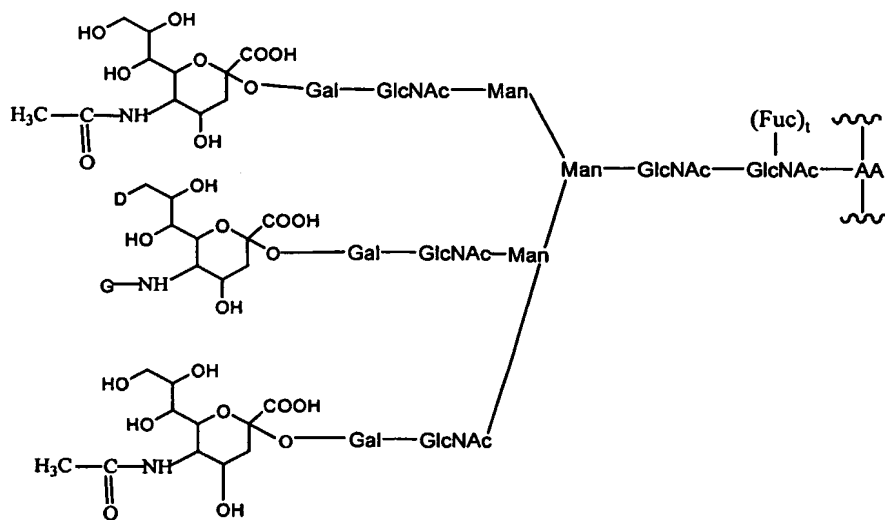
- 1 **19.** The peptide of claim 1, wherein said peptide comprises at least one of said  
 2 moiety according to a formula selected from:



6

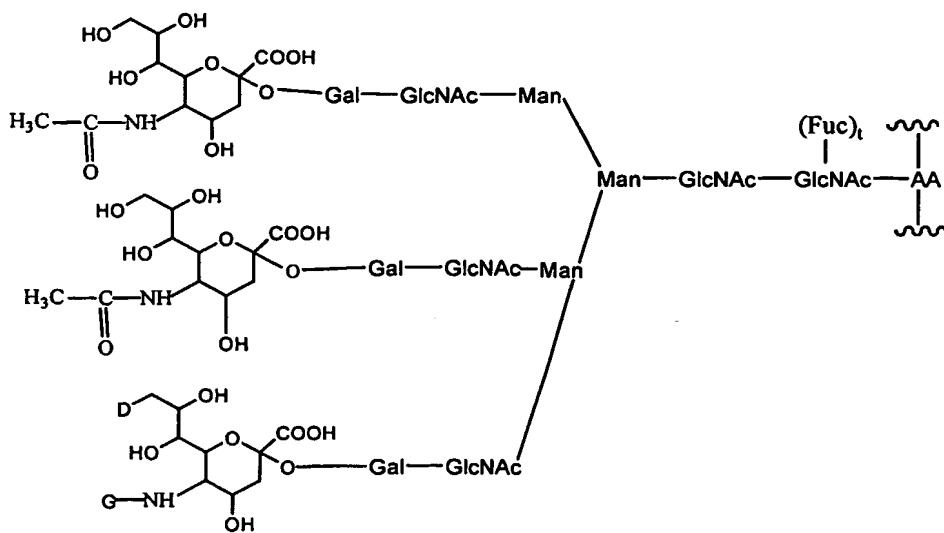


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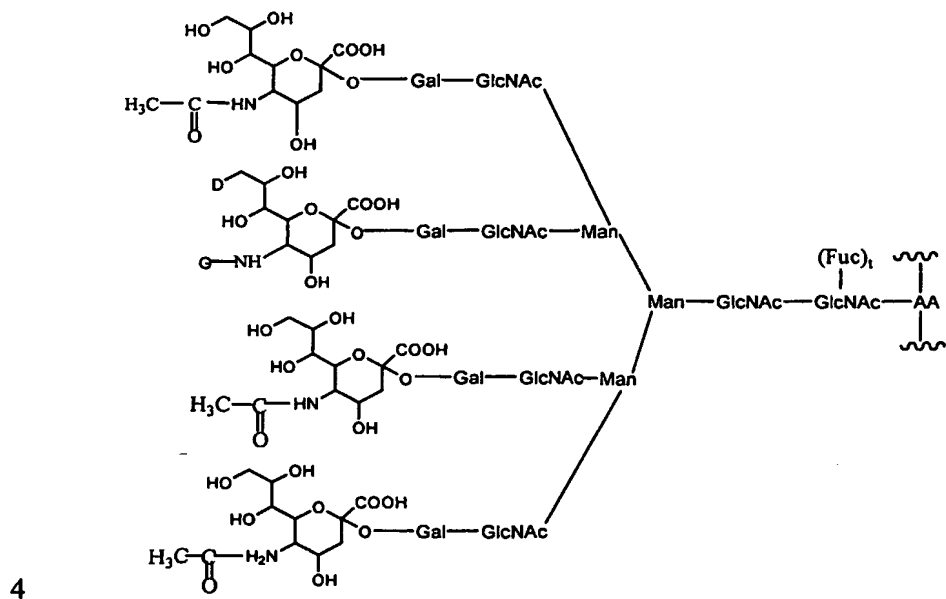
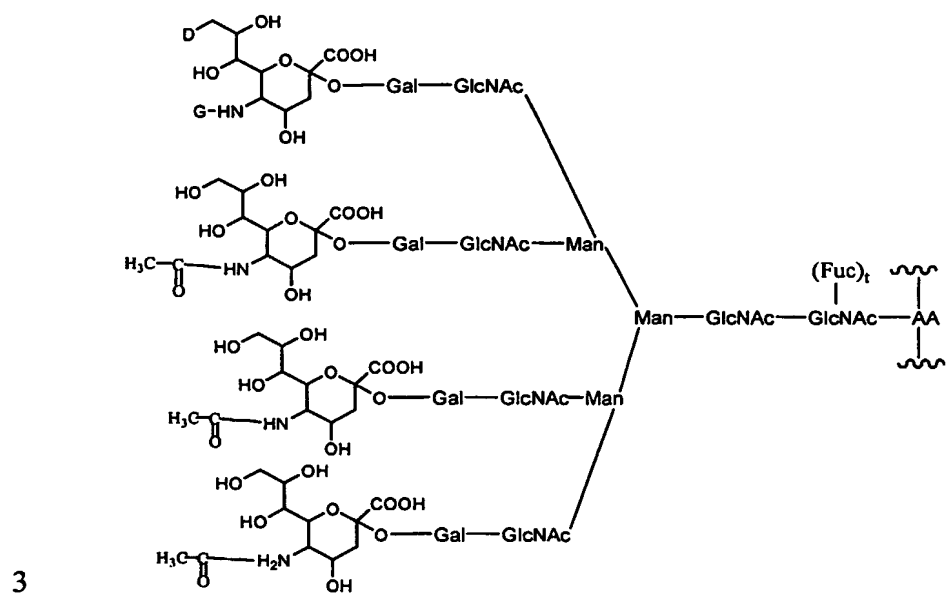
, and

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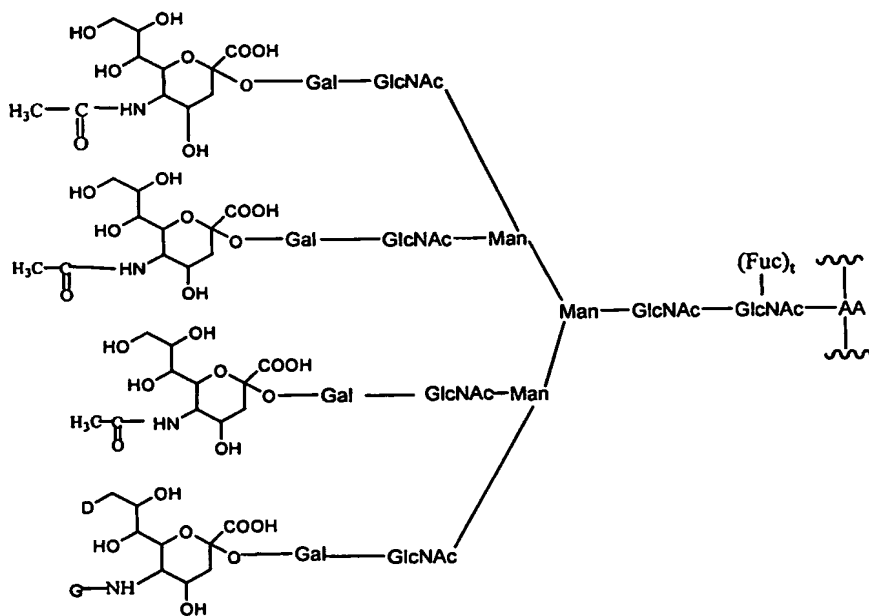
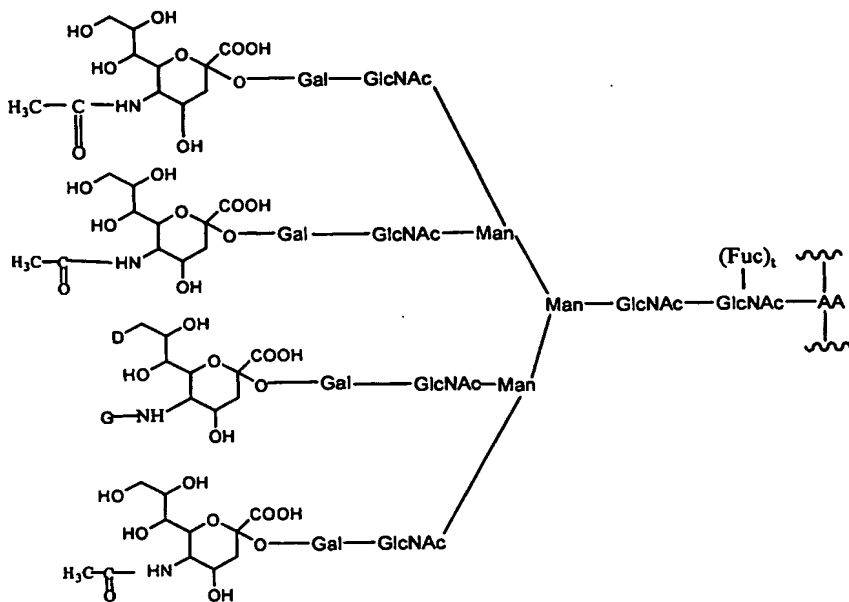
9            wherein AA is an amino acid residue of said peptide, and t is an integer equal to  
10    0 or 1.

1     **20.**     The peptide according to claim 1 wherein said peptide comprises at least one  
2     said moiety according to a formula selected from:





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7 wherein AA is an amino acid residue of said peptide, and t is an integer equal to 0  
8 or 1.

1 21. The peptide according to claim 20, wherein said amino acid residue is an  
2 asparagine residue.

1 22. The peptide according to claim 21, wherein said peptide has the amino acid  
 2 sequence of SEQ ID NO:1, and wherein said amino acid residue is an asparagine  
 3 residue which is a member selected from N24, N38, N83, and combinations thereof.

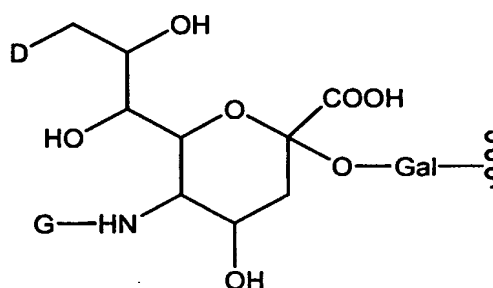
1 23. The peptide according to claim 1, wherein said peptide is a bioactive  
 2 erythropoietin peptide.

1 24. The peptide according to claim 23, wherein said peptide is erythropoietically  
 2 active.

1 25. The peptide according to claim 24, wherein said peptide is essentially non-  
 2 erythropoietically active.

1 26. The peptide according to claim 25, wherein said peptide is tissue protective.

1 27. A method of making a PEG-ylated erythropoietin comprising the moiety:



2

3

wherein

4

$R^1$  is a moiety comprising straight-chain or branched poly(ethylene glycol)  
 residue; and

5

6

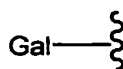
L is a linker which is a member selected from substituted or unsubstituted  
 alkyl and substituted or unsubstituted heteroalkyl,  
 said method comprising:

8

9

(a) contacting a substrate erythropoietin peptide comprising the

10 glycosyl moiety:

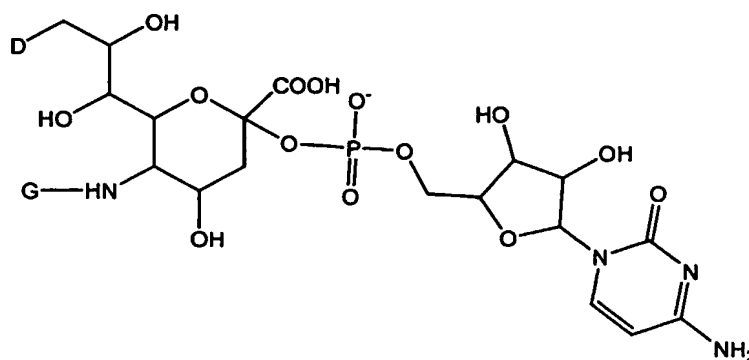


11

12

13

with a PEG-sialic acid donor moiety having the formula:



14

15

and an enzyme that transfers said PEG-sialic acid onto the Gal of said glycosyl

16

moiety, under conditions appropriate to for said transfer.

1 28. The method of claim 27, further comprising, prior to step (a):

2 (b) expressing said substrate erythropoietin peptide in a suitable host.

1 29. The method of claim 28, wherein said host is selected from an insect cell and a  
2 mammalian cell.

1 30. The method of claim 29, wherein said insect cell is a *Spodoptera frugiperda*  
2 cell line.

1 31. A method of treating a condition in a subject in need thereof, said condition  
2 characterized by compromised red blood cell production in said subject, said method  
3 comprising the step of administering to the subject an amount of a peptide according  
4 to claim 1, effective to ameliorate said condition in said subject.

1 32. A method of enhancing red blood cell production in a mammal, said method  
2 comprising administering to said mammal an peptide according to claim 1.

1 33. A method of treating a tissue injury in a subject in need thereof, said injury  
2 characterized by damage resulting from ischemia, trauma, inflammation or contact  
3 with toxic substances, said method comprising the step of administering to the subject  
4 an amount of an erythropoietin peptide according to claim 1, effective to ameliorate  
5 the damage associated with the tissue injury in said subject.

1 34. A pharmaceutical formulation comprising the erythropoietin peptide according  
2 to claim 1, and a pharmaceutically acceptable carrier.